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Central Data 2650 Newsletter

I bet you thought you were never going to see this issue of the newsletter! Well, I apologize for the (large) delay, but I wanted to make sure that all of our software packages were finished up before starting it.

I am glad to say that we accomplished that goal--all of the software which we have announced has been shipped. Also, many of you will be glad to know that we will probably be offering a Startrek program within the next two months which includes a special character generator with all of the space ships, etc. as well as a full set of chess characters!

The response from the release of our ALP and 12K BASIC packages have been great! There is no doubt that these are the easiest to use and best software products we have ever made. The 12K BASIC runs much faster than the 8K BASIC, and has a vast number of improved and additional statements and functions. The ALP (assembly language package) has a copy of our super-editor/assembler and debugger packages. Since all three of these programs are "under one roof", alot of space is saved by having common sub-routines.

To the right you can see a picture of the staff at Central Data. We are not going to divulge the identity of the people in the picture until next issue so you can make wild guesses as to who belongs to those bodies.

I hope that you enjoy this issue of the newsletter, and appreciate any input that you send to me for the next issue.

LETTERS

Dear Mr. Roloff:

Enclosed is a copy of a disassembler chart for the 2650. We find this a very handy reference device and would like to pass it on to you and perhaps readers of your newsletter. You may feel free to reproduce it directly.

We hope to receive the tape version of the 12K BASIC soon. (Maybe this month?)

Best Regards,

Bruce Block
Henry Gut
Space Research Building
University of Michigan
Ann Arbor, MI 48109

Dear Bruce and Henry:

Thanks for the chart! I'm sure it will help people out when they need to quickly de-cipher some op-codes. 12K BASIC was sent recently, which completes all of the software items that we have previously announced.
ED.

Dear Jeff:

Enclosed is a program written by C. Mundt called 'SMART' which allows the Central Data 2650 system to be used as a terminal for another system.

Before we begin I would like to thank the many people who have helped me, particularly Clarence Mundt. Without his help I would still be back in the dark ages. I would also like to thank Mike Herbach and you, Jeff. My many 'dumb' questions undoubtably drove you both up the wall--thanks everybody!!!

Hardware--my system uses the flag and sense lines from the 2650 to transmit and receive data. Those lines are connected to optical isolators to isolate the two microprocessors. This provides not only electrical isolation but immunity from noise (one of my major problems). The lines, through two twisted pairs--one ground and one data--are connected to a serial (RS232) port on my 8080 system. What this means is that the Central Data unit can be used as a terminal for any system which has a serial port (ie an 8080 Z-80, 6800, TRS-80, PET, etc.)

Software--the software must be run in high memory. The version included at the end of this does not echo keyboard inputs as most existing software has internal echo routines. The comments should be self explanatory.

If you should have any questions concerning the software or hardware please send me a cassette and I will be glad to help you. My motives are not ultruistic in this regard. I'm hoping that all of you will make additions and improvements and that you will let me know about the alternative uses for this software.

Clarence is working on a subroutine that will allow a buffer area to be created in the 2650 system memory. At that point we will be able to dump programs and data from the 2650 terminal to the second system and vice versa. In my case this will allow me to store 2650 software on my floppy disk in my 8080 system. The buffer routine will be sent in for the next newsletter

Mike Kelley
9951 Delco Avenue
Chatsworth, CA 91311
213-349-8796

Mike:

Thanks for the new version of the terminal program. I know that I have talked to alot of people who have used their system for this purpose. Unfortunately, we don't have room in this issue for the program, but we will run it for sure in April. ED.

Dear Jeff,

Thank you for sending the newsletter. I am looking forward to receiving the next issue. My computer is now running OK after a few minor problems! (The problems seemed anything but minor at the time)

My system consists of:

CDC 2650 and S-100
Jameco keyboard with seperate hex pad
23" all transistor TV
16K static RAM
RS232C interface for teletype 43
Upper and lower case char generator in 2758 PROM
Modified supervisor in 2758 EPROM

With considerable help from a friend, Mike Durham, I now have software that allows me to print "anything and everything" with the teletype 43. I can print text, the screen, and assembled programs.

Mike, who also has a CDC 2650 unit, has developed a number of interesting programs which I am enclosing for possible inclusion in your newsletter.

The programs are:

1) MORSE CODE. This program will generate audible morse code at a user selectable rate. It will convert to morse code any recognisable character that is typed in the text area of memory. Some sort of "noise maker" is required. I used a BELL

AUDIOALARM but I find the frequency is a bit high. A similiar device with a frequency of 700 to 1200 hertz would be OK. A speed code of 28/33 gives a morse rate of about 10 words per minute. Connect audio device to OUT6 (plug 84, pin 13) via an NPN transistor with a 2.2K resistor in series with the base.

2) TEXT PRINTER program for the Teletype 43. (all at 300 baud)

3) GOLF GAME (8K BASIC). This program generates: obstacle height, hole position, and wind direction and velocity.

Frustrated game player enters stroke power and elevation. Silly computer then proceeds to miss the hole just about every time and has the nerve to abuse the player. Good luck suckers, you will need it!!

4) MATH TEST (8K BASIC). I modified this program from May 78 Personal Computing to suit CDC 8K BASIC. A slight modification to the BASIC is required. The POKE commands at the start of the program delete the LFCR from the INPUT command. I think the rest of the program is self explanatory.

5) 2758 EPROM MOD. Diagram of modifications required to fit 2758 EPROMS in place of 3624's for the supervisor and character generator. A 24 pin wire wrap socket soldered to a PROM holder with a few modifications (as shown in the diagram) between the two does the job nicely.

6) FLASH. This is a modification to both the Editor/Assembler and BASIC that flashes the data on the screen (upper right hand corner) whilst loading or storing source code and BASIC programs.

Editor/ Assembler
H259C 3F 33 C9
H33C7 3F 02 4F CB F9 17
H25FB 3F 33 C0
H33BE CD E5 52 CB F9 17

BASIC
24FB 1F 17 C2
17C0 3F 02 E9 CB F9 1F 24 FB
2574 3F 17 CD
17CB 3F 02 4F CB F9 1F 25 77

Mike has a few problems with the Editor/ Assembler that I hope you can help with.

1) HALT and NOP don't always generate correct machine code.
2) "T" error message is never printed.
3) Assm sometimes does not put 0000 at end of tape dump.
4) Some programs printed in the newsletter use arithmetic on labels. The CDC assembler does not understand them. This causes great confusion to inexperienced programmers (me!).

I have one problem with the BASIC. Is there a fix that allows the SIN of angles from 180 to 360 degrees?

I have noticed that some people are having trouble loading tapes made on different recorders. I had this problem and overcame it in the following way. The tape recorder I use has a DC motor with a speed trimming pot inside the motor. I removed this pot, attached flying leads out to a 10 turn 500 ohm pot with a multi-turn dial. The end result is that with a bit of adjustment I can load any tape (so far anyhow!).

We had some trouble getting the morse code program to run on my computer (it ran without problem on Mikes unit). After a lot of worry, abuse, phone calls, and finally a visit from Mike, the trouble was tracked down.

The problem was caused by the fact that the lower part of the program status word (PSL), in particular the register select bit (bit 4) is not set to select register bank 0 on start up. The PSL is set to the random value that appears in memory location H17F2 at start up. The above caused the morse code program to do some funny things when the program hits the first register bank change instruction. The cure to this problem is to preset the PSL at the start of the program.

Credit for the enclosed programs go to:

Math Test: Jim Charlton
All Others: Mike Durham
27 Kingsley Grove
Mount Waverley
Victoria 3149
Australia

Since I started this letter Mike has developed two more rather clever mods for the Editor/ Assembler which I will enclose.

7) "E" writes end of text address on screen using command E.

8) ERRORS. Prints number of errors that have occured during assembly of a program.

Note: programs 7 and 8 were assembled by me--they work--but may not be what you would call elegant programming.

I am fast running out of memory so I had better finish up.

Yours faithfully,

Jim R. Charlton
7 Oakton Close
Mulgrave, Victoria 3170
Australia

Jim:

Thanks alot for the letter and all of the programs. Unfortunately, we don't have room to run all of the programs this issue, but we will put them in future issues.

Concerning your problems with the assembler, I suggest that on HALT and NOP instructions you extend the line to at least the operand field. You can do this by simply hitting TAB after entering the opcode. This fills the register field with spaces, which solves the problem.

I can't understand why the "T" error message is never printed for you, but it is true that the assembler sometimes doesn't send out a zero block at the end of tape dumps. To solve this, I suggest you increase the size of your BSB area. Finally, the Editor/Assembler does not allow arithmetic expressions in the operand field (unlike our disk assembler). The ALP package, however, does allow such operations.

The 8K BASIC does have problems when it comes to the trig functions at certain angles. Unfortunately, there is no way to correct this problem. Naturaly, the Extended BASIC has this problem fixed. ED.

Jeff:

You probably have received many suggestions for modifications to the Executive ROM, such as making the dump portion of TPOT a sub-routine so it can be called from user programs. This is a replacement for the tape delay routines for the 2.5MHz 2650.

(Address H026F)

```
D6      BSTR,UN  D2     Do it once
        BSTR,UN  D2     Do it again
*                       Fall through, do again
D2      LODI,R0  DB
DL2     RETC,EQ         Dummy--3 cycle delay
        BDRR,R0  DL2    Branch Back
*                       Fall Through for ½ bit
D1      LODI,R0  DB
DL1     RETC,EQ
        BDRR,R0  DL1
        RETC,UN
        NOP             Dummy--fill out 16 bytes
```

You may want to suggest in your newsletter using the A15 address line on the S-100 board for the INTACK line, since that would disable the memory and allow inserting a vector onto the data bus.

Thanks,

Nathan Myers

Nathan:

Thanks for the suggestion. I know several people are planning on updating their system for the new 2650.

Concerning your suggestion about the INTACK line, I think it would be best to use pin 96 for this since it is given that use in other systems. ED.

SUBSCRIPTION INFORMATION

The Central Data 2650 Newsletter is published every 8 weeks by Central Data Corporation. Any comments should be sent to Central Data Corp.; PO Box 2530 Station A; Champaign, IL 61820.

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Editor: Jeff Roloff

Gentlemen:

Enclosed is a copy of BACKUP, a program I have written and used for some time. Having altered both the assembler and BASIC many times, I find it invaluable to create new copies of these programs. It is compatable with your supervisor's tape loader. You may publish it in your newsletter if you wish.

I am creating this form letter with a program I call EDITOR ONLY. It is a copy of your editor taken from the assembler (full function version) plus my text writer code. Perhaps this is a practical use for a home computer. I can put a letter completely together on the screen before putting it on paper.

Sincerely,

Ray Krygier
25353 Crown Point Court
Farmington Hills, MI 48018

Ray:

Its good that you sent in this program which so many people have asked for! It is especialy nice because of all of the messages that it gives, which aid greatly in the use of the program. ED.

Dear Jeff:

Just a note to say that I enjoyed the newsletter last month. I have enclosed a program that some of the hams out there may enjoy. It sure makes antenna design easy.

I am now conducting a weekly net dedicated to the 2650. It is held every thursday at 2330Z on 3.993 MHz SSB. It is called the 2650 computer users net and is only one week old at this time (9/78). So far there are only three of us, but I have been in contact with several others who are going to join us. I would appreciate it if you would mention us in the newsletter as soon as possible so that we might have maximum participation. So far we have discussed saturation recording, Signetics application notes, RTTY applications, RAM supervisor, RAM character generator, static/dynamic memory, and power supplies. I am looking forward to a great exchange of ideas about this system.

Thanks,

Jerry J. Johnson
1707A Forrest Avenue
Fort Meade, MD 20755
301-672-2033

Jerry:

Thanks for the program! (Readers can find it later in the newsletter.) I'm sure that it will save alot of time for our ham radio readers. Hopefully this letter will get more people tuning into your net. It sure sounds like you are covering alot of bases with it! Let us know how it goes. ED.

Jeff,

As careful as I was in writing up my modifications for the Radio Shack keyboard, two errors crept in. The first was from my additions to the typed copy not being fully legible and the second was pure oversight. At any rate, here they are, with my apologies: first, the two AND gate sections on the right hand side are sections of Z19, the 7408 added to the circuit for the mod. They can easily be read incorrectly as Z14. The second error is the exclusion of two necessary connections. To fully correct the instructions, here is a new instruction "C":

Jumper lines to be added:

1) From trace above cut at break key to trace below cut at break key.
2) From Z12-16 to line between "." and up arrow keys.
3) From broken trace at repeat key to line between "U" and "5" keys.

Again, I apologize for these errors and assure everyone that with them fixed the keyboard will produce all codes from 0 to 7F.

Mike Herbach

Below is a continuation of the list of people who want to talk to others about their system. The name, address, and city are all seperated by a semicolon, and if they gave a telephone number it is preceded by a '#'. Any special interests are preceded by a colon.

Remember that you can send this information in on a 3x5 card in order to be published in the newsletter. Chances are, someone out there has the same interests as you do!

Alan Shigemura;2030 Fern Street; Honolulu, HI 96826 #808-949-0330 :Multiplexing multiterminal interface

Frits Schoute; Orionlaan 94; 1223 AJ Hilversum, Netherlands #31 35 831881: Word processing, Telephone switching

Mark J. Schlaffer; 2401 W. Broadway, Apt 627; Col., MO 65201 #314-445-3128

Robert A. Robards; Independence Hill; Van Voorhis Rd.; Morgantown, WV 26508 #304-599-6507: Business hardware and software

Jack Harris; 1240 Fair Oaks Drive; Irving, TX 75060 #214-253-4059 : Residential energy and security management

Douglas Doane; 2227 Amlevst; Kalamazoo, MI 49008: 16K byte on-board RAM expansion

Steven Gibbs; Merkas Klita; Ben Yehuda, Natanya, Israel: games

Jim Charlton; 7 Oakton Close; Mulgrave, Victoria 3107, Australia #(03) 560-3206: Development of weather monitoring station, Educational programs (for children)

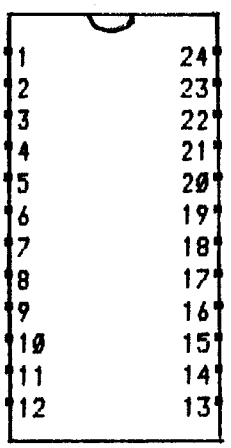
Tony E. Pajnic; 3859 Cloverdale Road; Medway, OH 45341 #513-849-0347: Learning assembly programming.

N. F. Simmons; 8192 Santa Margarita Lane; La Palma, CA 90623

Nathan Myers; 48 Kahoa Street; Hilo, HI 96720 #808-935-7807 :2650 applied to everything--multiprocessing, word processing, assembly programming, APL

EPROM Mod by Mike Durham

Enables 2758 to be plugged into 3624 socket.



A7	1	24	+5 VOLT
A6	2	23	A8
A5	3	22	A9---> PIN 19 ON 3624 PLUG (CS3)
A4	4	21	VPP-->+5V (PIN 24)
A3	5	20	$\overline{CS}$---> PIN 21 ON 3624 PLUG ($\overline{CS1}$)
A2	6	19	AR---> ØV OR TO ADDRESS LINE 1Ø FOR 2K MEMORY
A1	7	18	PD/PGM--> ØV (PIN 12)
AØ	8	17	O7
OØ	9	16	O6
O1	1Ø	15	O5
O2	11	14	O4
GND	12	13	O3

LEADS ARE CONNECTED DIRECTLY THROUGH (PIN FOR PIN) FROM 2758 SOCKET TO 3624 PLUG, EXCEPT WHERE INDICATED

1/ FOR 2K MEMORY, 2758 PIN 19 IS CONNECTED TO A1Ø VIA FLYING LEAD TO IC2 PIN 6

2/ IF 2758 SUPERVISOR IS TO BE USED, PLUG CONVERTER INTO IC 1Ø SOCKET, THIS CONNECTS 2758 A9 INPUT TO CORRECT LINE

3/ IF 2758 CHARACTER GENERATOR IS USED, FIT TO IC 48 SOCKET

Dear Sir:

The newsletter is, I find, very interesting and informative and I am looking forward to it being published on a regular basis every 8 weeks.

I have written two programs that I would like to sell to any interested readers. I would like to purchase a second disk drive and a printer but I need a little extra cash. The first program is a game, SPACEWAR, which is very similar to SCELBI's GALAXY GAME FOR THE 8008/8080. This program is supplied in machine code on cassette tape for $10.00 and occupies less than 5K starting at H2000. The second program is a dissassembler which converts machine code to assembler using absolute addresses instead of labels. Its display format is similar to the Editor/Asm format during Pass 2 except that there are no line numbers or labels.

The dissassembler was developed to debug a fault on the DOS software which isn't supplied with any program listings. It is suitable for my present requirements but requires a few finishing touches. I don't intend to dress it up unless others are interested in the program. The dissassembler is available for $5.00 and will be available approximately two weeks after I receive the first order. This program occupies less than 2K and starts at H4000 and H7000. i.e. the same program dumped in two seperate memory locations, you load just one from cassette tape.

The editor/assembler tape control by Mike Herbach was found to be very useful and led me to see if the 8K BASIC interpreter could also be easily modified. It can, the modification I used is:

2538 3F 17 67
2056 3F 17 7A
1767 04 08 F0 04 24 05 FE 06 02 F8 7E F9 7C
FA 7A 3F 23 D6 17 20 F0 3F 21 4E 17

With both the editor/assembler and BASIC I find it inconvenient shifting for UPPER CASE so I incorporated the following mods:

BASIC

25BC 1F 17 50
1750 08 89 F4 60 98 02 44 5F C8 81 17 25 B1

Editor/Assembler

21EA change 3F 03 0F to where you want the mod. I put mine at 3580. It is better to keep it out of the display memory block i.e. dont put it between H1500 and H1800.
3580 73 F7 80 18 7B F7 60 98 02 47 5F CB 10
3F 03 96 73 F7 80 98 7B 0B 06 E7 1B 1C
00 83 17 00

The above modifications have been proof read and hopefully no errors exist. If any do exist please accept my sincere apologies.

Yours sincerely,

Roger Miskowicz

Dear Roger:

It is good to see that you have come up with a couple programs that you can offer our customers...and the price is very reasonable. Thanks for the patches to the programs. I am sure that they will help out many people. ED.

****

Below is listed a computer club that we recently learned about as well as the only name we received who wanted to talk to others about his system. If anyone else is interested in having their name and interests published, just send it in on a post card.

Amateur Computer Club
2650 Library
51 Beechwood Drive
Feniscowles
Blackburn, Lancs BB2 5AT
ENGLAND

Dave Peterson WA4EPW
4670 Pennsylvania Avenue
Roanoke, VA 24019
(703) 563-9611
Interests: amateur radio and terminal use

****

FILE 'BASICMOD' AS ASSEMBLED BY SYSTEM ON 01-24-79

```
LINE  ADDR B1 B2 B3 B4 LABEL   OPCODE     OPERAND    COMMENTS

0001  4025               *
0002  4025               *
0003  4025               *       BASIC12 VERSION 1.3 MODIFICATIONS
0004  4025               *
0005  4025               *       PROGRAM PATCHES
0006  4025               *       PRINT USING FIX
0007  4025               *
0008  179C                       ORG        179C          #
0009  179C 22 A2        IPUSP    ACON       PUSP          #
0010  179E 08 FC        NEWC7    LODR,R0    *IPUSP        #
0011  17A0 E4 FF                 COMI,R0    FF            #
0012  17A2 18 0B                 BCTR,EQ    NEWC10        #
0013  17A4 1B 07                 BCTR,UN    NEWC9         #
0014  17A6 04 20        NEWC8    LODI,R0    20            #
0015  17A8 3F 24 C5              BSTA,UN    SENDIT        #
0016  17AB A5 01                 SUBI,R1    01            #
0017  17AD 59 77        NEWC9    BRNR,R1    NEWC8         #
0018  17AF 03           NEWC10   LODZ,R3                  #
0019  17B0 1F 30 B5              BCTA,UN    INCSP2        #
0020  17B3               *
0021  17B3               *       TAPE CONTROL--
0022  17B3               *       TURNS ON AND OFF TAPE FROM BI
0023  17B3               *
0024  17B3 04 00        ZTOFF    LODI,R0    0             *
0025  17B5 F0                    WRTD,R0                  *
0026  17B6 17                    RETC,UN                  *
0027  17B7 3B 7A        ZOUT1    BSTR,UN    ZTOFF         *
0028  17B9 07 49                 LODI,R3    49            *
0029  17BB 1F 2F 4C              BCTA,UN    ERR2          *
0030  17BE 3F 73        ZOUT2    BSTR,UN    ZTOFF         *
0031  17C0 1F 4A 7F              BCTA,UN    DISP          *
0032  17C3 04 24        ZWAIT    LODI,R0    24            *
0033  17C5 05 FE                 LODI,R1    FE            *
0034  17C7 06 02                 LODI,R2    02            *
0035  17C9 F8 7E        ZLOOP    BDRR,R0    ZLOOP         *
0036  17CB F9 7C                 BDRR,R1    ZLOOP         *
0037  17CD FA 7A                 BDRR,R2    ZLOOP         *
0038  17CF 17                    RETC,UN                  *
0039  17D0 04 08        ZTON     LODI,R0    08            *
0040  17D2 F0                    WRTD,R0                  *
0041  17D3 17                    RETC,UN                  *
0042  17D4 3B 7A        ZREAD    BSTR,UN    ZTON          *
0043  17D6 1F 51 FC              BCTA,UN    AOK           *
0044  17D9 3B 7F        ZWRITE   BSTR,UN    ZTON          *
0045  17DB 3B 66                 BSTR,UN    ZWAIT         *
0046  17DD 1F 51 FC              BCTA,UN    AOK           *
0047  17E0               *
0048  17E0               *       BASIC12 CHANGES
0049  17E0               *       PRINT USING FIXES
0050  17E0               *
0051  2325                       ORG        PRNTS3        #
0052  2325 1F 17 9E              BCTA,UN    NEWC7         #
0053  2328               *
0054  2328               *       TAPE CONTROL
0055  2328               *
```

FILE 'BASICMOD' AS ASSEMBLED BY SYSTEM ON 01-24-79

```
LINE  ADDR B1 B2 B3 B4 LABEL   OPCODE     OPERAND    COMMENTS

0056  5130                     ORG        5130          *
0057  5130 3F 17 D4            BSTA,UN    ZREAD         *
0058  513C                     ORG        513C          *
0059  513C 1F 17 B7            BCTA,UN    ZOUT1         *
0060  4989                     ORG        4989          *
0061  4989 3F 17 BE            BSTA,UN    ZOUT2         *
0062  5141                     ORG        5141          *
0063  5141 3F 17 D9            BSTA,UN    ZWRITE        *
0064  44C7                     ORG        44C7          *
0065  44C7 1C 24 9B            BCTA,EQ    PRNTD6        *
0066  44CA               *
0067  44CA               *       BASIC12 VERSION 1.4 MODIFICATIONS
0068  44CA               *
0069  44CA               *       BASIC12 CHANGES
0070  44CA               *       VARPTR FUNCTION FIX
0071  44CA               *
0072  3E06                     ORG        BTOD2         #
0073  3E06 04 66               LODI,R0    66            #
0074  3E08 88 6F               ADDR,R0    BTODS+2       #
0075  3E0A C8 2A               STRR,R0    BDS+2         #
0076  3E0C 04 66               LODI,R0    66            #
0077  3E0E 88 6E               ADDR,R0    BTODS+1       #
0078  3E10 C8 23               STRR,R0    BDS+1         #
0079  3E12 04 66               LODI,R0    66            #
0080  3E14 88 61               ADDR,R0    BTODS         #
0081  3E16 C8 1C               STRR,R0    BDS           #
0082  3E18 77 08               PPSL       WC            #
0083  3E1A D3                  RRL,R3                   #
0084  3E1B D2                  RRL,R2                   #
0085  3E1C 08 19               LODR,R0    BDS+2         #
2286  3E1E 88 59               ADDR,R0    BTODS+2       #
0087  3E20 94                  DAR ,R0                  #
0088  3E21 C8 56               STRR,R0    BTODS+2       #
0089  3E23 08 10               LODR,R0    BDS+1         #
0090  3E25 88 51               ADDR,R0    BTODS+1       #
0091  3E27 94                  DAR ,R0                  #
0092  3E28 C8 4E               STRR,R0    BTODS+1       #
0093  3E2A 08 08               LODR,R0    BDS           #
0094  3E2C 88 49               ADDR,R0    BTODS         #
0095  3E2E 94                  DAR ,R0                  #
0096  3E2F CC 1D F7            STRA,R0    BTODS         #
0097  3E32 1B 13               BCTR,UN    BTOD5         #
0098  3E34 00 00 00  BDS      RES        3             #
0099  3E37               *
0100  3E37               *       CLEAR STATEMENT FIX
0101  3E37               *
0102  3E37 CC 13 4F     BASIC2   STRA,R0    CTEMP+1       *
0103  3E3A 3F 45 91              BSTA,UN    ERASE         *
0104  3E3D 1F 20 4C              BCTA,UN    BASIC3        *
0105  3E40               *                                *
0106  3E40 CC 80 CA     PURGET   STRA,R0    *TABEND       *
0107  3E43 1F 20 31              BCTA,UN    BASIC4        *
0108  3E46               *                                *
0109  2019                     ORG        2019          *
0110  2019 3F 22 52              BSTA,UN    PURGES        *
```

FILE 'BASICMOD' AS ASSEMBLED BY SYSTEM ON 01-24-79

```
LINE  ADDR B1 B2 B3 B4 LABEL   OPCODE     OPERAND    COMMENTS

0111  201C CC 01 2E            STRA,R0    PDATA         *
0112  201F CC 06 34            STRA,R0    ERWAIT        *
0113  2022 CC 05 4B            STRA,R0    INON          *
0114  2025 CC 10 D8            STRA,R0    SP+1          *
0115  2028 CC 01 2E            STRA,R0    DATPNT+1      *
0116  202B CC 02 9F            STRA,R0    DOLFCR        *
0117  202E 1F 3E 37            BCTA,UN    BASIC2        *
0118  2031 0A 51        BASIC4   LODR,R2    IBST          *
0119  2033 CE 13 4E            STRA,R2    CTEMP         *
0120  2036               *                                *
0121  2049                     ORG        BASIC3-3      *
0122  2049 17                  RETC,UN                  *
0123  204A               *
0124  204A               *       BASIC12 VERSION 1.5 MODIFICATIONS
0125  204A               *
0126  204A               *       PROGRAM PATCHES
0127  204A               *       PRINT @ FIX
0128  204A               *
0129  1796                     ORG        1796          #
0130  1796 77 08        WHYAT    PPSL       WC            #
0131  1798 75 01               CPSI       CRY           #
0132  179A D1                  RRL ,R1                  #
0133  179B 17                  RETC,UN                  #
0134  179C               *
0135  179C               *       BASIC12 CHANGES
0136  179C               *       PRINTL FIX
0137  179C               *
0138  22B3                     ORG        22B3          *
0139  22B3 1B 03               BCTR,UN    PRNTLL        *
0140  22B5               *
0141  22B5               *       PRINT @ FIX
0142  22B5               *
0143  2431                     ORG        2431          #
0144  2431 3F 17 96            BSTA,UN    WHYAT         #
```

Jeff:

As usual with programs written against a deadline, a few errors crept into the Startrek game. Actually only the first item is an error, the other is an improvment in one of the functions. Here they are:

1517 68
24C6 3F 17 61
1761 3F 26 C4 3F 28 57 1F 2B B6

For tape dump purposes, memory used is now from A1510 to A1769 and A2000 to A3FFD. Program execution is still at A2000.

Mike Herbach

Antenna Computer program by Jerry Johnson

```
(AS) THIS PROGRAM WAS WRITTEN FOR THE CENTRAL-DATA 2650
(AS) COMPUTER BY JERRY J JOHNSON ON 15 JUNE 78. IT IS
(AS) WRITTEN IN 8K BASIC.
(AS)
(AS) ANTENNA COMPUTER
(AS)
(AS) (AS) MEANS ASTERIX
(AS) (PL) MEANS PLUS
(AS) (AT) MEANS AT
(AS) (PC) MEANS PERCENT
(AS) (PD) MEANS POUNDS
(AS) (LT) MEANS LESS THAN
(AS) (GT) MEANS GREATER THAN
(AS) (EQ) MEANS EQUAL
(AS)
1 ERASE
PRINT ' ANTENNA LENGTH FORMULAS, WHAT TYPE DO YOU WANT? '
PRINT 'DIPOLE (ENTER DIPO)'
PRINT 'VERTICAL (ENTER VERT)'
PRINT 'FULL WAVE LOOP (ENTER LOOP)'
PRINT 'QUAD/ DELTA LOOP (ENTER QUAD)'
PRINT 'BEAM (ENTER BEAM)'
INPUT B$
IF B$(EQ)'DIPO' GOTO 5
IF B$(EQ)'VERT' GOTO 10
IF B$(EQ)'LOOP' GOTO 15
IF B$(EQ)'QUAD' GOTO 20
IF B$(EQ)'BEAM' GOTO 25
ERASE
PRINT'I DON''T KNOW WHAT TYPE ANTENNA THAT IS, TRY AGAIN.'
FOR Z(EQ)1 TO 20
NEXT Z
GOTO 1
5 ERASE
PRINT 'DIPOLE'
INPUT'FREQUENCY IN MEGAHERTZ(EQ)'F
L(EQ)468/F
PRINT 'LENGTH OF DIPOLE IS 'L' FEET'
INPUT 'WANT TO DO IT AGAIN ? (Y/N)'A$
IF A$(EQ)Y GOTO 5
GOTO 100
10 ERASE
PRINT 'VERTICAL'
INPUT'FREQUENCY IN MEGAHERTZ(EQ)'F
L(EQ)234/F
I(EQ)240/F
PRINT 'VERTICAL(EQ) 'L' FT'
PRINT'RADIALS(EQ) 'I' FT'
INPUT 'DO YOU WANT TO DO IT AGAIN ? (Y/N)' A$
IF A$(EQ)'Y' GOTO 0
GOTO 100
15 ERASE
PRINT 'LOOP'
INPUT'FREQUENCY IN MEGAHERTZ(EQ)'F
L(EQ)1005/F
PRINT ' LENGTH(EQ) 'L' FEET CIRCUMFERENCE OR'
PRINT L/4' FEET PER SIDE FOR FOUR SIDES OR'
PRINT L/3' FEET PER SIDE FOR THREE SIDES'
INPUT 'DO YOU WANT TO DO IT AGAIN ? (Y/N)' A$
IF A$(EQ)'Y' GOTO 15
GOTO 100
20 ERASE
PRINT'QUAD/LOOP'
INPUT'FREQ(EQ)'F
L(EQ)1005/F
D(EQ)963/F
R(EQ)1030/F
PRINT'DRIVEN ELEMENT (QUAD)'L/4' FEET PER SIDE'
PRINT 'REFLECTOR (QUAD)'R/4' FEET PER SIDE'
PRINT 'DIRECTOR (QUAD)'D/4' FEET PER SIDE'
PRINT
PRINT 'DRIVEN ELEMENT (DELTA)'L/3' FEET PER SIDE'
PRINT 'REFLECTOR (DELTA)'R/3' FEET PER SIDE'
PRINT 'DIRECTOR (DELTA)'D/3' FEET PER SIDE'
PRINT
PRINT 'DRIVEN ELEMENT (TOTAL CIRCUMFERENCE)'L' FEET'
PRINT 'REFLECTOR (TOTAL CIRCUMFERENCE)'R' FEET'
PRINT 'DIRECTOR (TOTAL CIRCUMFERENCE)'D' FEET'
INPUT' DO YOU WANT TO DO IT AGAIN ? (Y/N)' A$
IF A$(EQ)'Y' GOTO 20
GOTO 100
25 ERASE
PRINT 'BEAM'
INPUT'FREQUENCY IN MEGAHERTZ(EQ)'F
L(EQ)476/F
D(EQ)450/F
R(EQ)501/F
S(EQ)120/F
PRINT
PRINT'DRIVEN ELEMENT (TOTAL TIP-TO-TIP) 'L' FEET'
PRINT'REFLECTOR (TOATAL TIP-TO-TIP) 'R' FEET'
PRINT'DIRECTOR (TOTAL TIP-TO-TIP) 'D' FEET'
PRINT 'OPTIMUM SPACING (.2 WAVELENGTH) 'S' FEET'
INPUT 'DO YOU WANT TO DO IT AGAIN ? (Y/N)' A$
IF A$(EQ)'Y' GOTO 25
100 INPUT 'DO YOU WANT TO TRY ANOTHER ANTENNA TYPE ? (Y/N)' A$
IF A(EQ)'Y' GOTO 1
ERASE
PRINT 'THANK YOU'
STOP
```

Backup program by Ray Krygier

```
                        PRNT
0003  0000               *
0004  0000               R0      EQU     0
0005  0000               R1      EQU     1
0006  0000               R2      EQU     2
0007  0000               R3      EQU     3
0008  0000               CUR1    EQU     17FE
0009  0000               CUR2    EQU     17FF
0010  0000               LFCR    EQU     0024
0011  0000               WCHR    EQU     0396
0012  0000               UN      EQU     3
0013  0000               EQ      EQU     0
0014  0000               LT      EQU     2
0015  0000               GT      EQU     1
0016  0000               KBIN    EQU     030F
0017  0000               INHX    EQU     01B6
0018  0000               HXDT    EQU     006A
0019  0000               SUMC    EQU     17F9
0020  0000               ADD1    EQU     17FA
0021  0000               ADD2    EQU     17FB
0022  0000               LENT    EQU     17EA
0023  0000               COCD    EQU     3A
0024  0000                       PRNT
0025  0000               *
0026  0000               ******    BACKUP    ******
0027  0000               *
0028  1510                       ORG     1510
0029  1510               *
0030  1510 04 02         BEGIN   LODI,R0  02      INIT PSW
0031  1512 93                    LPSL
0032  1513 04 40                 LODI,R0  40
0033  1515 92                    LPSU
0034  1516               *
0035  1516 3F 16 02              BSTA,UN  CLSCR   CLEAR SCREEN
0036  1519               *
0037  1519 05 20                 LODI,R1  20      POSITION CURSOR
0038  151B CD 97 FE              STRA,R1  *CUR1
0039  151E 05 10                 LODI,R1  10
0040  1520 CD 17 FE              STRA,R1  CUR1
0041  1523 05 41                 LODI,R1  41
0042  1525 CD 17 FF              STRA,R1  CUR2
0043  1528 05 1C                 LODI,R1  1C
0044  152A CD 97 FE              STRA,R1  *CUR1
0045  152D               *
0046  152D 05 FF         MS01    LODI,R1  FF      WRITE MSG #1
0047  152F 0D 36 10      MS01A   LODA,R1  MSG1,+
0048  1532 18 06                 BCTR,EQ  INPUT
0049  1534 C3                    STRZ,R3
0050  1535 3F 03 96              BSTA,UN  WCHR
0051  1538 1B 75                 BCTR,UN  MS01A
0052  153A               *
0053  153A 3F 01 B6      INPUT   BSTA,UN  INHX    WAIT FOR REPLY
0054  153D CF 16 0F              STRA,R3  ENDADR
0055  1540               *
0056  1540 3F 00 24      MS02    BSTA,UN  LFCR    WRITE MSG #2
0057  1543 05 FF                 LODI,R1  FF
0058  1545 0D 36 33      MS02A   LODA,R1  MSG2,+
0059  1548 18 06                 BCTR,EQ  GO
0060  154A C3                    STRZ,R3
0061  154B 3F 03 96              BSTA,UN  WCHR
0062  154E 1B 75                 BCTR,UN  MS02A
0063  1550 3F 03 0F      GO      BSTA,UN  KBIN    WAIT FOR OPERATOR RESPONSE
0064  1553               *
0065  1553 04 08                 LODI,R0  08      START TAPE
0066  1555 F0                    WRTD,R0
0067  1556 05 10                 LODI,R1  10
0068  1558 07 60         DL2     LODI,R3  60
0069  155A 3F 02 78      DL3     BSTA,UN  0278
0070  155D FB 7B                 BDRR,R3  DL3
0071  155F F9 77                 BDRR,R1  DL2
0072  1561               *
0073  1561 04 20                 LODI,R0  20      SET START TO 2000
0074  1563 CC 16 0E              STRA,R0  SAVE
0075  1566               *
0076  1566 3F 16 02      START   BSTA,UN  CLSCR
0077  1569 05 FF                 LODI,R1  FF
0078  156B 0D 36 55      MS03A   LODA,R1  MSG3,+
0079  156E 18 06                 BCTR,EQ  STR1
0080  1570 C3                    STRZ,R3
0081  1571 3F 03 96              BSTA,UN  WCHR
0082  1574 1B 75                 BCTR,UN  MS03A
0083  1576               *
0084  1576 0C 16 0E      STR1    LODA,R0  SAVE    SETUP BLOCK ADDRESS
0085  1579 CC 17 FA              STRA,R0  ADD1
0086  157C C2                    STRZ,R2
0087  157D 3F 00 6A              BSTA,UN  HXOT
0088  1580 20                    EORZ,R0
0089  1581 CC 17 FB              STRA,R0  ADD2
0090  1584 C2                    STRZ,R2
0091  1585 3F 00 6A              BSTA,UN  HXOT
0092  1588 04 FF                 LODI,R0  FF
0093  158A CC 17 EA              STRA,R0  LENT
0094  158D 3F 15 C7              BSTA,UN  TAPOUT  WRITE IT TO TAPE
0095  1590               *
0096  1590 0C 16 0E              LODA,R0  SAVE
0097  1593 84 01                 ADDI,R0  01
0098  1595 CC 16 0E              STRA,R0  SAVE
0099  1598 EC 16 0F              COMA,R0  ENDADR
0100  159B 9D 15 66              BCFA,GT  START
0101  159E               *
0102  159E 20                    EORZ,R0
0103  159F CC 17 FA              STRA,R0  ADD1
0104  15A2 CC 17 FB              STRA,R0  ADD2
0105  15A5 CC 17 EA              STRA,R0  LENT
0106  15A8 3F 15 C7              BSTA,UN  TAPOUT  WRITE IT TO TAPE
0107  15AB               *
0108  15AB 04 00                 LODI,R0  00      STOP TAPE
0109  15AD F0                    WRTD,R0
0110  15AE               *
0111  15AE 3F 00 24              BSTA,UN  LFCR    WRITE MSG #4
0112  15B1 3F 00 24              BSTA,UN  LFCR
0113  15B4 05 FF                 LODI,R1  FF
0114  15B6 0D 36 6D      MS04    LODA,R1  MSG4,+
0115  15B9 18 06                 BCTR,EQ  STOP
0116  15BB C3                    STRZ,R3
0117  15BC 3F 03 96              BSTA,UN  WCHR
0118  15BF 1B 75                 BCTR,UN  MS04
0119  15C1 3F 03 0F      STOP    BSTA,UN  KBIN    ANY KEY TO RETURN TO 2000
```